

App. No. 09/271,008
Amtd. Dated October 22, 2003
Reply to Office Action of July 31, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1 1. (Currently Amended) A method for preserving frame order across an aggregated link
2 comprising:
3 receiving ~~up to~~ a plurality of indications denoting commencement of data packet
4 transmission over the aggregated link having a plurality of virtual links each associated
5 with a particular quality of service level; and
6 assigning a plurality of pointer values to a corresponding plurality of records in
7 appropriate buffers, from among a plurality of pointer value buffers associated with the
8 corresponding plurality of virtual links, based at least in part on ~~a~~ the relative order in
9 which data packets are transmitted on each of the links, the corresponding pointer value
10 associated with each respective data packet being used to determine an order according to
11 complete reception of the frame in which the respective data packet is promoted.

1 2. (Previously Presented) The method of claim 1, further comprising:
2 receiving the transmitted data packets from each of the plurality of virtual links in a common
3 receive buffer.

1 3. (Previously Presented) The method of claim 2, further comprising:
2 reading received data packets from the common receive buffer based, at least in part, on the
3 pointer value assigned in each of the pointer value buffers.

1 4. (Previously Presented) The method of claim 3, wherein the data packets are promoted
2 from the receive buffer with priority given to pointer values in pointer value buffers associated
3 with the virtual links having higher quality of service levels.

1 5. (Previously Presented) The method of claim 1, wherein a plurality of pointer value
2 buffers are used to store pointer values denoting the commencement of transmission of data
3 packets on a corresponding plurality of virtual links supporting a discrete quality of service
4 levels.

1 6. (Previously Presented) The method of claim 1, wherein received data packets are
2 promoted in pointer value order with priority given to pointer value buffers associated with the
3 virtual links with higher quality of service characteristics.

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- 1 7. (Original) The method of claim 1, wherein the indication is an analog indication.
- 1 8. (Original) The method of claim 7, wherein the data network is an Ethernet network and
2 the indication is a receive data valid (RX_DV) signal.
- 1 9. (Previously Presented) The method of claim 1, wherein the order of pointer values in
2 each of the pointer value buffers do not correspond to the order of data packet transmission.

- 1 10. (Currently Amended) An apparatus comprising:

2 a receive buffer having a plurality of records in which to store frames of data received from a
3 plurality of virtual links, each virtual link associated with a particular quality of service level;
4 a plurality of pointer value buffers each associated with at least one of the plurality of
5 virtual links; and
6 a network interface, coupled to the receive buffer and the pointer value buffers, to assign
7 a plurality of pointer values to an appropriate buffer, from among the plurality of pointer
8 value buffers, in response to the commencement of transmission of data packets on the
9 associated virtual link, the assignment of pointer values based, at least in part, on a the
10 relative order in which the frames are transmitted on each of the virtual links, the
11 corresponding pointer value associated with each respective frame being used to
12 determine an order according to complete reception of the frame in which the respective
13 frame is promoted from the receive buffer.

- 1 11. (Original) The apparatus of claim 10, wherein frames transmitted over each of the virtual
2 links are stored in the common receive buffer until retired by the apparatus.
- 1 12. (Original) The apparatus of claim 10, wherein the indication is an analog indication.
- 1 13. (Original) The apparatus of claim 12, wherein the indication is an asserted receive data
2 valid signal.
- 1 14. (Previously Presented) The apparatus of claim 10, wherein the network interface retires
2 the received data packets from the receive buffer to a system state in order of pointer value in
3 each of the plurality of pointer value buffers.
- 1 15. (Previously Presented) The apparatus of claim 14, wherein the data packets are retired in
2 pointer value order for each of the plurality of pointer value buffers, with priority given to
3 pointer value buffers associated with higher quality of service virtual links.

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DB 1 16. (Currently Amended) In a data network, a method for preserving frame order of a
2 plurality of frames transmitted across a plurality of virtual links of a multi-link trunk, each of the
3 virtual links is associated with a discrete quality of service, the method comprising:

4 receiving up to a plurality of indications denoting commencement of frame transmission
5 on each of the virtual links of the multi-link trunk; and

6 assigning a plurality of pointer values to a plurality of records in appropriate buffers, the
7 plurality of records corresponding to a number of indications received from each of the
8 virtual links, the appropriate buffers chosen from among a plurality of pointer value
9 buffers associated with the plurality of virtual links, the assignment of the plurality of
10 pointer values based at least in part on a relative order in which the indications are
11 received, the corresponding pointer value associated with each respective indication
12 being used to determine an order according to complete reception of the frame in which
13 each corresponding frame is promoted.

1 17. (Original) The method of claim 16, further comprising promoting the received frames
2 from a common receive buffer in pointer value order of the pointer value buffers, with priority
3 given to the pointer value buffers associated with the virtual links having higher quality of
4 service characteristics.

1 18. (Original) The method of claim 16, wherein the indications are an analog signal denoting
2 receive data valid.

TH 1 19. (Currently Amended) A storage medium comprising a plurality of executable instructions
2 which, when executed by a processor, cause the processor to implement a plurality of functions
3 including a function to preserve frame order of frames transmitted over a plurality of virtual links
4 each associated with a discrete quality of service, the function implementing pointer value
5 buffers associated with each of the virtual links and, upon receiving an indication of frame
6 transmission from the virtual link, stores pointer values in appropriate buffers from among the
7 pointer value buffers, the pointer values denoting a the relative order of commencement of frame
8 transmission on the virtual link, the pointer value associated with each respective indication of
9 frame transmission being used to determine an order according to complete reception of the
10 frame in which each corresponding frame is promoted.

1 20. (Original) The storage medium of claim 19, wherein the executable instructions further
2 include instructions to promote data frames received in a common buffer from the plurality of
3 virtual links in pointer value order as stored in the pointer value buffers, with priority given to
4 pointer values stored in pointer value buffers associated with high quality of service
5 characteristics.

1 21. (Previously Presented) An apparatus comprising:
2 a multi-link trunk including a high-speed link and a low-speed link; and
3 a network interface including

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- 4 a first pointer value buffer associated with the high-speed link,
5 a second pointer value buffer associated with the low-speed link,
6 a receive buffer from which packets of data are promoted in an assigned order based on
7 pointer values with priority given to pointer values in the first pointer value buffer.

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- 2 22. (Previously Added) The apparatus of claim 21, wherein the network interface further
3 includes

4 a multiplexer having an output coupled to the first pointer value buffer, the second
5 pointer value buffer and the receive buffer; and

6 a plurality of media access controllers coupled to inputs of the multiplexer.

- 1 23. (Previously Added) The apparatus of claim 22, wherein the network interface further
2 includes a plurality of physical links each coupled to a corresponding media access controller of
3 the plurality of media access controllers.

- 1 24. (Previously Added) The apparatus of claim 21, wherein the receive buffer promotes
2 packets of data associated with a pointer value of the second pointer value buffer only if all
3 frames of data associated with a pointer value of the first pointer value buffer has been promoted.